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# P A T E N T

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## UTILITY CERTIFICATE – CERTIFICATE OF ADDITION

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Drawn up in Paris, 02 OCT. 2003

On behalf of the Director-General of the  
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**REQUEST FOR GRANT**  
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DB 540 W J260899

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DATE **26 SEPT 2002**

PLACE **75 INPI PARIS B**

NATIONAL REGISTRATION No. **02/11,949**

ASSIGNED BY THE INPI

DATE OF FILING ASSIGNED BY THE INPI **26 SEPT. 2002**

**Your file references:**

(optional) **OA02280/SD**

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**Confirmation of filing by fax**

☐ No. assigned by the INPI to the fax

**2 NATURE OF THE APPLICATION**

**Tick one of the 4 following boxes**

Patent application

☒

Utility certificate application

☐

Divisional application

☐

*Initial patent application*

No.

Date  /  /

*or initial utility certificate application*

No.

Date  /  /

Conversion of a European patent application

*Initial application*

☐

No.

Date  /  /

**3 TITLE OF THE INVENTION (200 characters or spaces maximum)**

Block polymers and cosmetic compositions comprising such polymers

**4 PRIORITY DECLARATION OR APPLICATION FOR THE BENEFIT OF THE FILING DATE OF A PRIOR FRENCH APPLICATION**

Country or organisation  
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Country or organisation  
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# PATENT

## UTILITY CERTIFICATE

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page 2/2

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### 7 INVENTOR (S)

The inventors are the applicants

☐ Yes

☒ No In this case, provide a separate designation of the inventor(s)

### 8 SEARCH REPORT

For a patent application only (including division and conversion)

Immediate compilation

☒

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☐

Fee paid in instalments

Payment in three instalments, for natural persons only

☐ Yes

☒ No

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10 SIGNATURE OF THE APPLICANT  
OR REPRESENTATIVE  
(name and capacity of the signatory)

Denis BOULARD

26 September 2002

[signature]

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**DESIGNATION OF THE INVENTOR(S)** Page No. . 1 . / . 1  
(if the applicant is not the inventor or the sole inventor)

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DB 113 W / 260899

<b>Your file references</b> (optional)		OA02280/BN/SD	
<b>NATIONAL REGISTRATION NO.</b>		02/11,949	
<b>TITLE OF THE INVENTION</b> (200 characters or spaces maximum)			
Block polymers and cosmetic compositions comprising such polymers			
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17 January 2003 [signature] Denis BOULARD			

The present invention relates to novel polymers of specific structure.

5 The present invention also relates to cosmetic compositions comprising such polymers.

Various types of polymers are conventionally used in cosmetic compositions due to the various properties which they can contribute to these compositions.

10 They are, for example, used in compositions for making up or caring for the skin, lips or superficial body growths, such as nail varnishes or hair compositions. However, on using two incompatible polymers within the same composition, that is to say polymers which are  
15 immiscible in the same solvent, the formulator is confronted, due to the incompatibility of the polymers, with problems of separation of phases, indeed even of settling, and generally with a nonhomogeneous composition being obtained. These problems could only  
20 be solved to date by the presence in the composition of a compound which makes it possible to render the polymers compatible with one another.

The aim of the present invention is to provide a  
25 polymer which, when it is included in a composition, in particular a cosmetic composition, makes it possible for this composition not to exhibit the disadvantages, limitations, failings and drawbacks of the compositions of the prior art.

30 This aim is achieved, in accordance with the present invention, by virtue of a polymer, referred to as a block polymer, comprising at least one first block and at least one second block which are incompatible with  
35 one another and which have different glass transition temperatures ( $T_g$ ), said first and second blocks being connected to one another via an intermediate segment comprising at least one constituent monomer of the

first block and at least one constituent monomer of the second block, said polymer having a polydispersity index I of greater than 2.

5 "At least" one block is understood to mean one or more blocks.

The intermediate segment comprising at least one constituent monomer of the first block and at least one  
10 constituent monomer of the second block of the polymer makes it possible to "compatibilize" these blocks.

When incorporating these novel polymers in cosmetic compositions, the Applicant Company has discovered that  
15 some of these polymers, described in more detail below, have highly advantageous cosmetic properties. Generally, these polymers can be incorporated in compositions at a high content of dry matter, typically of greater than 10%, and exhibit ease of formulation.  
20 Used in hair products, they improve both the styling power and the suppleness thereof. They increase the impact strength of nail varnishes and improve the hold of a great variety of makeup compositions without causing a feeling of discomfort in the user.

25 Another subject matter of the invention is a cosmetic composition comprising such a polymer.

Another subject matter of the invention is also a  
30 cosmetic method for making up or caring for keratinous substances comprising the application, to the keratinous substances, of a cosmetic composition according to the invention.

35 The invention also relates to the use of the polymer according to the invention in a cosmetic composition as agent for improving the hold of said composition.

Finally, the invention relates to the use of the polymer according to the invention in a composition exhibiting improved hold properties.

5

Specifically, the polymer according to the invention is a linear polymer. This means that the invention is not intended to cover polymers having a nonlinear structure, for example branched, star, grafted or other structure.

10

Preferably, the polymer according to the invention is soluble and/or dispersible, at ambient temperature (25°C), at an active material content of at least 10% by weight, in at least one solvent (in particular an organic solvent).

15

The polymer according to the invention comprises at least one first block (or sequence) and at least one second block (or sequence) which are incompatible with one another and which have different glass transition temperatures ( $T_g$ ), said first and second blocks being connected to one another via an intermediate segment comprising at least one constituent monomer of the first block and at least one constituent monomer of the second block, said polymer having a polydispersity index  $I$  of greater than 2.

20

25

The polydispersity index  $I$  of the polymer is equal to the ratio of the weight-average molar mass  $M_w$  to the number-average molar mass  $M_n$ .

30

The weight-average molar mass ( $M_w$ ) and the number-average molar mass ( $M_n$ ) are determined by gel permeation liquid chromatography (solvent THF, calibration curve drawn up with linear polystyrene standards, refractometric detector).

35

The weight-average molar mass ( $M_w$ ) of the polymer according to the invention is preferably less than or equal to 150 000 g/mol; it ranges, for example, from  
5 35 000 to 150 000 g/mol and better still from 45 000 to 100 000 g/mol.

The number-average molar mass ( $M_n$ ) of the polymer according to the invention is preferably less than or  
10 equal to 40 000; it ranges, for example, from 10 000 to 40 000 and better still from 12 000 to 25 000.

Preferably, the polydispersity index of the polymer according to the invention is greater than 2,  
15 preferably greater than or equal to 2.5 and better still greater than or equal to 2.8 and in particular between 2.8 and 6.

Each block or sequence of the polymer according to the  
20 invention results from one type of monomer or from several types of monomers which are different.

This means that each block can be composed of a homopolymer or of a copolymer; it being possible for this copolymer constituting the block to be, in its  
25 turn, random or alternating.

The intermediate segment comprising at least one constituent monomer of the first block and at least one constituent monomer of the second block of the polymer is itself a random polymer.

30

According to the invention, the first and second blocks have different glass transition temperatures.

The glass transition temperature ( $T_g$ ) is measured by  
35 DMTA (Dynamical and Mechanical Temperature Analysis).

In order to measure the glass transition temperature ( $T_g$ ) of the polymer, viscoelastometry tests are carried



out with a TA Instruments Polymer DMTA device (model DMA2980) on a sample of polymer film of approximately 200 ± 50 µm in thickness, 10 mm in width and 15 mm in length, after drying for 24 hours at 23°C and 50-55% relative humidity. A tensile stress is imposed on this sample. The sample is subjected to a static force of 0.01 N, on which a sinusoidal displacement of ± 8 µm is superimposed at a frequency of 1 Hz. The operation is thus carried out in the linear region, under low levels of strain. This tensile stress is applied to the sample at temperatures varying from -150°C to +220°C, with a variation in temperature of 3°C per minute.

The complex modulus  $E^* = E' + iE''$  of the polymer tested is then measured as a function of the temperature.

From these measurements, the dynamic storage modulus  $E'$  and the dynamic loss modulus  $E''$  are deduced, as well as the damping power:  $\text{tg}\delta = E''/E'$ .

The curve of the values of  $\text{tg}\delta$  as a function of the temperature is then plotted; this curve exhibits at least one peak. The glass transition temperature  $T_g$  of the polymer corresponds to the temperature at which the tip of this peak is situated.

When the curve exhibits at least two peaks (in this case, the polymer exhibits at least 2  $T_g$  values), the  $T_g$  value of the polymer tested is taken as being the temperature for which the curve exhibits the peak with the greatest amplitude (that is to say, corresponding to the highest value of  $\text{tg}\delta$ ; in this case, only the "majority"  $T_g$  value is regarded as  $T_g$  value of the polymer tested).

The difference between the glass transition temperatures of the first and second blocks is generally greater than 20°C, preferably greater than 30°C and better still greater than 40°C.

The first block advantageously has a Tg of greater than or equal to 40°C, for example a Tg ranging from 40 to 120°C, preferably of greater than 50°C and better still of greater than 60°C.

5 Preferably, the proportion of the block with a Tg of greater than or equal to 40°C ranges from 20 to 90% by weight of the polymer, better still from 30 to 80% by weight of the polymer and even better still from 50 to 70% by weight of the polymer.

10

The second block advantageously has a Tg of less than or equal to 20°C, for example from 20 to -80°C, preferably of less than 15°C and better still of less than 10°C.

15 Preferably, the proportion of the block with a Tg of less than or equal to 20°C ranges from 5 to 75% by weight of the polymer, preferably from 15 to 50% by weight of the polymer and better still from 25 to 45% by weight of the polymer.

20

The first block, which advantageously has a Tg of greater than or equal to 40°C, is a homopolymer or copolymer and preferably results, in all or in part, from one or more monomers which are such that the  
25 homopolymers prepared from these monomers have glass transition temperatures of greater than or equal to 40°C.

More preferably, this first block is a homopolymer composed of just one type of monomer (the Tg of the  
30 corresponding homopolymer of which is greater than or equal to 40°C).

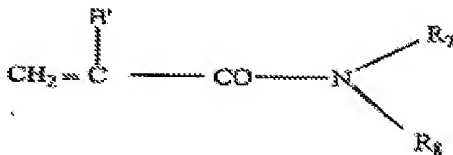
The monomers for which the homopolymers have glass transition temperatures of greater than or equal to  
35 40°C and from which result(s), preferably, the block or blocks with a Tg of greater than or equal to 40°C of

the polymer of the invention are preferably chosen from the following monomers:

5       - methacrylates of formula  $\text{CH}_2=\text{C}(\text{CH}_3)-\text{COOR}_1$   
 in which  $\text{R}_1$  represents a linear or branched alkyl group comprising from 2 to 4 carbon atoms, such as a methyl, ethyl, propyl or isobutyl group, it being possible for said alkyl group in addition to be  
 10       optionally substituted by one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I, F), or  $\text{R}_1$  represents a  $\text{C}_4$  to  $\text{C}_{12}$  cycloalkyl group,

15       - acrylates of formula  $\text{CH}_2=\text{CH}-\text{COOR}_2$   
 in which  $\text{R}_2$  represents a  $\text{C}_4$  to  $\text{C}_{12}$  cycloalkyl group, such as isobornyl acrylate, or a tert-butyl group,

      - (meth)acrylamides of formula:



20

where  $\text{R}_7$  and  $\text{R}_8$ , which are identical or different, each represent a hydrogen atom or a linear or branched  $\text{C}_1$  to  $\text{C}_{12}$  alkyl group, such as an n-butyl, t-butyl, isopropyl, isohexyl, isooctyl or isononyl group; or  $\text{R}_7$  represents H and  $\text{R}_8$  represents a 1,1-dimethyl-3-oxobutyl group;  
 25       and  $\text{R}'$  denotes H or methyl. Mention may be made, as examples of monomers, of N-butylacrylamide, N-(t-butyl)acrylamide, N-isopropylacrylamide, N,N-dimethylacrylamide and N,N-dibutylacrylamide,  
 30

- styrene and its derivatives, such as chlorostyrene,

- and their mixtures.

5

The monomers which are particularly preferred for the first block are methyl methacrylate, isobutyl methacrylate, isobornyl (meth)acrylate, trifluoroethyl methacrylate, styrene and their mixtures.

10

The second block, which advantageously has a Tg of less than or equal to 20°C, is a homopolymer or a copolymer and preferably results, in all or in part, from one or more monomers which are such that the homopolymers prepared from these monomers have glass transition temperatures of less than or equal to 20°C.

15

The monomers for which the homopolymers have Tg values of less than or equal to 20°C and from which result(s), preferably, the block or blocks with Tg values of less than or equal to 20°C of the polymer of the invention are preferably chosen from the following monomers:

20

- acrylates of formula  $\text{CH}_2=\text{CHCOOR}_3$ ,

25

$\text{R}_3$  representing a linear or branched  $\text{C}_1$  to  $\text{C}_{12}$  alkyl group with the exception of the tert-butyl group, in which occur(s), optionally intercalated, one or more heteroatoms chosen from O, N and S, it being possible for said alkyl group in addition to be optionally substituted by one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F), or  $\text{R}_3$  representing a  $\text{C}_1$  to  $\text{C}_{12}$  alkyl-POE (polyoxyethylene) with repetition of the oxyethylene unit from 5 to 30 times, for example methoxy-POE, or  $\text{R}_3$  representing a polyoxyethylene group comprising from 5 to 30 ethylene oxide units;

30

35

- methacrylates of formula  $\text{CH}_2=\text{C}(\text{CH}_3)-\text{COOR}_4$ ,  
R<sub>4</sub> representing a linear or branched C<sub>4</sub> to C<sub>12</sub> alkyl  
group, in which occur(s), optionally intercalated,  
one or more heteroatoms chosen from O, N and S, it  
5 being possible for said alkyl group in addition to  
be optionally substituted by one or more  
substituents chosen from hydroxyl groups and halogen  
atoms (Cl, Br, I, F);

10 - vinyl esters of formula  $\text{R}_5-\text{CO}-\text{O}-\text{CH}=\text{CH}_2$ ,  
where R<sub>5</sub> represents a linear or branched C<sub>4</sub> to C<sub>12</sub>  
alkyl group;

15 - C<sub>4</sub> to C<sub>12</sub> alkyl vinyl ethers, such as methyl  
vinyl ether and ethyl vinyl ether;

- N-(C<sub>4</sub> to C<sub>12</sub> alkyl)acrylamides, such as  
N-octylacrylamide;

20 - and their mixtures.

The monomers which are particularly preferred for  
the second block are the alkyl acrylates for which  
the alkyl chain comprises from 1 to 4 carbon atoms,  
25 with the exception of the tert-butyl group, such as  
methyl acrylate, isobutyl acrylate, 2-ethylhexyl  
acrylate and their mixtures.

30 Nevertheless, each of the blocks can comprise, in a  
minor proportion, at least one constituent monomer  
of the other block.

Thus, the first block can comprise at least one  
constituent monomer of the second block and vice  
versa.

35 Each of the first and/or second blocks can comprise  
a constituent monomer of the other block in an  
amount generally of less than or equal to 20% by

weight, for example from 1 to 20% by weight, preferably from 5 to 15% by weight and better still from 7 to 12% by weight, of the total weight of the first and/or the second block.

5

The first block, which advantageously has a glass transition temperature of greater than or equal to 40°C, and/or the second block, advantageously having a glass transition temperature of less than or equal to 20°C, can comprise, in addition to the monomers indicated above, one or more other different monomers referred to as additional monomers.

The nature and the amount of this or these additional monomers are preferably chosen so that the block in which they occur has the desired glass transition temperature.

This additional monomer is, for example, chosen from:

20

a) hydrophilic monomers, such as:

- monomers having ethylenic unsaturation(s) comprising at least one carboxylic or sulfonic acid functional group, such as, for example:

25

acrylic acid, methacrylic acid, crotonic acid, maleic anhydride, itaconic acid, fumaric acid, maleic acid, styrenesulfonic acid, acrylamidopropanesulfonic acid, vinylbenzoic acid, vinylphosphoric acid and the salts of these,

30

- monomers having ethylenic unsaturation(s) comprising at least one hydroxyl functional group, such as 2-hydroxypropyl methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl acrylate and 2-hydroxyethyl acrylate,

35

- monomers having ethylenic unsaturation(s) comprising at least one tertiary amine functional group, such as 2-vinylpyridine,

4-vinylpyridine, dimethylaminoethyl methacrylate, diethylaminoethyl methacrylate, dimethylaminopropylmethacrylamide and the salts of these,

- 5 b) monomers having ethylenic unsaturation comprising one or more silicon atoms, such as methacryloyloxypropyltrimethoxysilane or methacryloyloxypropyltris(trimethylsiloxy)silane, - and their mixtures.

10

This or these additional monomer(s) generally represent(s) an amount of less than or equal to 30% by weight, for example from 1 to 30% by weight, preferably from 5 to 20% by weight and more preferably from 7 to 15% by weight of the total weight of the first and/or second blocks.

15 The polymer according to the invention can be obtained by radical polymerization in solution according to the following preparation process:

20 - a portion of the polymerization solvent is introduced into a suitable reactor and is heated until the temperature appropriate for the polymerization is reached (typically between 60 and 120°C),

25 - once this temperature is reached, the constituent monomers of the first block are introduced in the presence of a portion of the polymerization initiator,

30 - at the end of a time T corresponding to a maximum degree of conversion of 90%, the constituent monomers of the second block and the other portion of the initiator are introduced,

35 - the mixture is allowed to react for a time T' (ranging from 3 to 6 h), at the end of which

the mixture is brought back to ambient temperature,  
- the polymer is obtained in solution in the polymerization solvent.

5

The term "polymerization solvent" is understood to mean a solvent or a mixture of solvents.

10 The time T corresponds to a degree of conversion of 90%, that is to say to a percentage of constituent monomers of the first block consumed of 90%.

The polymerization temperature preferably ranges from 60 to 120°C and preferentially from 80 to 100°C.

15

The polymerization initiator can be chosen from organic peroxides comprising from 8 to 30 carbon atoms; mention may be made, for example, of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane, sold under the reference Trigono<sup>x</sup>® 141 by Akzo Nobel.

20

The invention also relates to cosmetic compositions comprising the polymer of specific structure as described above.

25

Generally, these compositions comprise from 0.1 to 60% by weight, preferably from 0.5 to 50% by weight and more preferably from 1 to 40% by weight of the polymer according to the invention.

30

These cosmetic compositions according to the invention comprise, in addition to said polymers, a physiologically acceptable medium, that is to say a medium compatible with keratinous substances, such as the skin, hair, eyelashes, eyebrows and nails.

35



Said physiologically acceptable medium generally comprises an appropriate physiologically acceptable solvent in which the polymer according to the invention occurs in the dissolved or dispersed form. The composition can thus comprise a hydrophilic medium comprising water or a mixture of water and of hydrophilic organic solvent(s), such as alcohols and in particular linear or branched lower monoalcohols having from 2 to 5 carbon atoms, such as ethanol, isopropanol or n-propanol, and polyols, such as glycerol, diglycerol, propylene glycol, sorbitol, pentylene glycol and polyethylene glycols, or alternatively hydrophilic C<sub>2</sub> ethers and hydrophilic C<sub>2</sub>-C<sub>4</sub> aldehydes. The water or the mixture of water and of hydrophilic organic solvents can be present in the composition according to the invention in a content ranging from 0.1% to 99% by weight, with respect to the total weight of the composition, and preferably from 10% to 80% by weight.

The composition can comprise, in addition to the block polymer described above according to the invention, an additional polymer, such as a film-forming polymer. According to the present invention, the term "film-forming polymer" is understood to mean a polymer capable of forming, by itself alone or in the presence of an additional agent which is able to form a film, a continuous film which adheres to a support, in particular to keratinous substances.

Mention may be made, among the film-forming polymers which can be used in the composition of the present invention, of synthetic polymers of radical type or of polycondensate type, polymers of natural origin and their blends. Mention may in particular be made, as film-forming polymer, of acrylic polymers, polyurethanes, polyesters, polyamides, polyureas or cellulose polymers, such as nitrocellulose.

The composition can also comprise a fatty phase composed in particular of fatty substances which are liquid at ambient temperature (generally 25°C) and/or  
5 of fatty substances which are solid at ambient temperature, such as waxes, pasty fatty substances, gums and their mixtures. These fatty substances can be of animal, vegetable, mineral or synthetic origin. This fatty phase can additionally comprise lipophilic  
10 organic solvents.

Mention may be made, as fatty substances which are liquid at ambient temperature, often referred to as oils, which can be used in the invention, of:  
hydrocarbon oils of animal origin, such as  
15 perhydrosqualene; vegetable hydrocarbon oils, such as liquid triglycerides of fatty acids with 4 to 10 carbon atoms, such as triglycerides of heptanoic or octanoic acids, or also sunflower, corn, soybean, grape seed, sesame, apricot, macadamia, castor or avocado oils,  
20 triglycerides of caprylic/capric acids, jojoba oil or shea butter; linear or branched hydrocarbons of mineral or synthetic origin, such as liquid paraffins and their derivatives, liquid petrolatum, polydecenes or hydrogenated polyisobutene, such as parleam; synthetic  
25 esters and ethers, in particular of fatty acids, such as, for example, Purcellin oil, isopropyl myristate, 2-ethylhexyl palmitate, 2-octyldodecyl stearate, 2-octyldodecyl erucate or isostearyl isostearate; hydroxylated esters, such as isostearyl lactate, octyl  
30 hydroxystearate, octyldodecyl hydroxystearate, diisostearyl malate, triisocetyl citrate or heptanoates, octanoates or decanoates of fatty alcohols; polyol esters, such as propylene glycol dioctanoate, neopentyl glycol diheptanoate, diethylene  
35 glycol diisononanoate and pentaerythritol esters; fatty alcohols having from 12 to 26 carbon atoms, such as octyldodecanol, 2-butyloctanol, 2-hexyldecanol,

2-undecylpentadecanol or oleyl alcohol; partially hydrocarbon-comprising and/or silicone-comprising fluorinated oils; silicone oils, such as volatile or nonvolatile and linear or cyclic polymethylsiloxanes (PDMSs) which are liquid or pasty at ambient temperature, such as cyclomethicones, dimethicones, optionally comprising a phenyl group, such as phenyl trimethicones, phenyltrimethylsiloxydiphenylsiloxanes, diphenylmethyldimethyltrisiloxanes, diphenyl dimethicones, phenyl dimethicones, polymethylphenylsiloxanes; and their mixtures.

These oils can be present in a content ranging from 0.01 to 90% by weight and better still from 0.1 to 85% by weight, with respect to the total weight of the composition.

The composition according to the invention can also comprise one or more cosmetically acceptable (acceptable tolerance, acceptable toxicology and acceptable feel) organic solvents.

These solvents can generally be present in a content ranging from 0 to 90% by weight, preferably from 0.1 to 90% by weight, more preferably from 10 to 90% by weight, with respect to the total weight of the composition, and better still from 30 to 90% by weight.

Mention may be made, as solvents which can be used in the composition of the invention, in addition to the hydrophilic organic solvents mentioned above, of ketones which are liquid at ambient temperature, such as methyl ethyl ketone, methyl isobutyl ketone, diisobutyl ketone, isophorone, cyclohexanone or acetone; propylene glycol ethers which are liquid at ambient temperature, such as propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate or dipropylene glycol mono(n-butyl) ether; short-chain esters (having from 3 to 8 carbon atoms in

total), such as ethyl acetate, methyl acetate, propyl acetate, n-butyl acetate or isopentyl acetate; ethers which are liquid at ambient temperature, such as diethyl ether, dimethyl ether or dichlorodiethyl ether; 5 alkanes which are liquid at ambient temperature, such as decane, heptane, dodecane, isododecane or cyclohexane; cyclic aromatic compounds which are liquid at ambient temperature, such as toluene and xylene; aldehydes which are liquid at ambient temperature, such as benzaldehyde or acetaldehyde, and their mixtures. 10

The term "wax" within the meaning of the present invention is understood to mean a lipophilic compound which is solid at ambient temperature (25°C), which 15 exhibits a reversible solid/liquid change in state and which has a melting point of greater than or equal to 30°C which can range up to 120°C.

On bringing the wax to the liquid state (melting), it is possible to render it miscible with the oils 20 possibly present and to form a microscopically homogeneous mixture but, on bringing the temperature of the mixture back to ambient temperature, recrystallization of the wax in the oils of the mixture is obtained. The melting point of the wax can be 25 measured using a differential scanning calorimeter (DSC), for example the calorimeter sold under the name DSC 30 by Metler.

The wax can also exhibit a hardness ranging from 0.05 MPa to 15 MPa and preferably ranging from 6 MPa to 30 15 MPa. The hardness is determined by the measurement of the compressive force, measured at 20°C using the texture analyzer sold under the name TA-TX2i by Rheo, equipped with a stainless steel cylinder with a diameter of 2 mm which is displaced at the measurement 35 rate of 0.1 mm/s and which penetrates into the wax to a depth of penetration of 0.3 mm.

The waxes can be hydrocarbon, fluorinated and/or silicone waxes and can be of vegetable, mineral, animal and/or synthetic origin. In particular, the waxes exhibit a melting point of greater than 25°C and better  
5 still of greater than 45°C.

Mention may be made, as wax which can be used in the composition of the invention, of beeswax, carnauba wax, candelilla wax, paraffin wax, microcrystalline waxes, ceresin or ozokerite; synthetic waxes, such as  
10 polyethylene waxes or Fischer-Tropsch waxes, silicone waxes, such as alkyl or alkoxy dimethicones having from 16 to 45 carbon atoms.

The gums are generally polydimethylsiloxanes (PDMSs) of  
15 high molecular weight or cellulose gums or polysaccharides and the pasty substances are generally hydrocarbon compounds, such as lanolins and their derivatives, or else PDMSs.

The nature and the amount of the solid substances  
20 depend on the mechanical properties and textures desired. By way of indication, the composition can comprise from 0 to 50% by weight of waxes, with respect to the total weight of the composition, and better still from 1 to 30% by weight.

The polymer can be used in combination with one or more  
25 additional agents which are able to form a film. Such an agent which is able to form a film can be chosen from any compound known to a person skilled in the art as being capable of fulfilling the desired function and  
30 can in particular be chosen from plasticizing agents and coalescence agents.

The composition according to the invention can additionally comprise one or more coloring materials  
35 chosen from water-soluble dyes and pulverulent coloring materials, such as pigments, pearlescent agents and glitter, well known to a person skilled in the art. The

coloring materials can be present in the composition in a content ranging from 0.01% to 50% by weight, with respect to the weight of the composition, preferably from 0.01% to 30% by weight.

5

The term "pigments" should be understood as meaning white or colored and inorganic or organic particles of any shape which are insoluble in the physiological medium and which are intended to color the composition.

10

The term "pearlescent agents" should be understood as meaning iridescent particles of any shape produced in particular by certain mollusks in their shells or else synthesized.

15

The pigments can be white or colored and inorganic and/or organic. Mention may be made, among inorganic pigments, of titanium dioxide, optionally surface-treated, zirconium or cerium oxides, and also zinc, iron (black, yellow or red) or chromium oxides, manganese violet, ultramarine blue, chromium hydrate and ferric blue, or metal powders, such as aluminum powder or copper powder.

20

Mention may be made, among organic pigments, of carbon black, pigments of D & C type, and lakes, based on cochineal carmine, of barium, strontium, calcium or aluminum.

25

The pearlescent pigments can be chosen from white pearlescent pigments, such as mica covered with titanium oxide or with bismuth oxychloride, colored pearlescent pigments, such as titanium oxide-coated mica covered with iron oxides, titanium oxide-coated mica covered with in particular ferric blue or chromium oxide, or titanium oxide-coated mica covered with an organic pigment of the abovementioned type, and pearlescent pigments based on bismuth oxychloride.

30

35

The water-soluble dyes are, for example, beetroot juice or methylene blue.

The composition according to the invention can additionally comprise one or more fillers, in particular in a content ranging from 0.01% to 50% by weight, with respect to the total weight of the composition, preferably ranging from 0.01% to 30% by weight. The term "fillers" should be understood as meaning colorless or white and inorganic or synthetic particles of any shape which are insoluble in the medium of the composition, whatever the temperature at which the composition is manufactured. These fillers are used in particular to modify the rheology or the texture of the composition.

The fillers can be inorganic or organic fillers of any shape, platelet, spherical or oblong, whatever the crystallographic form (for example, leaf, cubic, hexagonal, orthorhombic, and the like). Mention may be made of talc, mica, silica, kaolin, polyamide (Nylon®) powders (Orgasol® from Atochem), poly- $\beta$ -alanine powders, polyethylene powders, powders formed of tetrafluoroethylene polymers (Teflon®), lauroyllysine, starch, boron nitride, polymeric hollow microspheres, such as those of polyvinylidene chloride/acrylonitrile, for example Expancel® (Nobel Industrie), or of acrylic acid copolymers (Polytrap® from Dow Corning), silicone resin microbeads (Tospearls® from Toshiba, for example), polyorganosiloxane elastomer particles, precipitated calcium carbonate, magnesium carbonate, basic magnesium carbonate, hydroxyapatite, hollow silica microspheres (Silica Beads® from Maprecos), glass or ceramic microcapsules, or metal soaps derived from organic carboxylic acids having from 8 to 22 carbon atoms, preferably from 12 to 18 carbon atoms, for example zinc stearate, magnesium stearate, lithium stearate, zinc laurate or magnesium myristate.

The composition according to the invention can also

comprise ingredients commonly used in cosmetics, such as vitamins, thickeners, trace elements, softeners, sequestering agents, fragrances, basifying or acidifying agents, preservatives, sunscreen agents, 5 surfactants, antioxidants, agents for combating hair loss, antidandruff agents, propellants or their mixtures.

Of course, a person skilled in the art will take care to choose this or these optional additional compounds 10 and/or their amounts so that the advantageous properties of the corresponding composition according to the invention are not, or not substantially, detrimentally affected by the envisaged addition.

15 The composition according to the invention can be provided in particular in the form of a suspension, dispersion, solution, gel, emulsion, in particular oil-in-water (O/W) or water-in-oil (W/O) or multiple (W/O/W or polyol/O/W or O/W/O) emulsion, cream, foam, 20 dispersion of vesicles, in particular of ionic or nonionic lipids, two-phase or multiphase lotion, spray, powder or paste, in particular soft paste (in particular paste having a dynamic viscosity at 25°C of the order of 0.1 to 40 Pa·s under a shear rate of 25 200 s<sup>-1</sup>, after measuring for 10 minutes in cone/plate geometry). The composition can be anhydrous; for example, it can be an anhydrous paste.

A person skilled in the art can choose the appropriate 30 dosage form and its method of preparation on the basis of his general knowledge, taking into account, on the one hand, the nature of the constituents used, in particular their solubility in the support, and, on the other hand, the application envisaged for the 35 composition.



The composition according to the invention can be a makeup composition, such as products for the complexion (foundation), face powders, eyeshadows, products for the lips, concealers, blushers, mascaras, eyeliners, products for making up the eyebrows, lip or eye pencils, products for the nails, such as nail varnishes, products for making up the body or products for making up the hair (hair mascara or lacquer).

10 The composition according to the invention can also be a hair product, in particular for the form retention of the hairstyle or the shaping of the hair. The hair compositions are preferably shampoos, gels, hair setting lotions, blowdrying lotions or fixing and  
15 styling compositions, such as lacquers or sprays.

The lotions can be packaged in various forms, in particular in vaporizers or pump-action sprays or in aerosol containers, in order to ensure application of  
20 the composition in the vaporized form or in the foam form. Such packaging forms are indicated, for example, when it is desired to obtain a spray or a foam for fixing or treating the hair.

25 The examples which follow illustrate, without implied limitation, the polymers according to the invention. The amounts are expressed in grams.

30 **Example 1: Preparation of a poly(methyl methacrylate/acrylic acid/methyl acrylate) polymer**

100 g of butyl acetate are introduced into a 1 liter reactor and then the temperature is increased so as to change from ambient temperature (25°C) to 90°C in  
35 1 hour.

180 g of methyl methacrylate, 30 g of acrylic acid, 40 g of butyl acetate, 70 g of isopropanol and 1.8 g of

2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane (Trigonox<sup>®</sup> 141 from Akzo Nobel) are subsequently added at 90°C in 1 hour.

The mixture is maintained at 90°C for 1 hour.

5 90 g of methyl acrylate, 70 g of butyl acetate, 20 g of isopropanol and 1.2 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane are subsequently introduced into the preceding mixture, still at 90°C and in 1 hour.

10 The mixture is maintained at 90°C for 3 hours and then diluted with 105 g of butyl acetate and 45 g of isopropanol; the combined product is then cooled.

A 40% solution of polymer active material in the butyl acetate/isopropanol mixture is obtained.

15

A polymer is obtained comprising a first poly(methyl methacrylate/acrylic acid) block or sequence having a Tg of 100°C, a second polymethyl acrylate block or sequence having a Tg of 10°C and an intermediate block  
20 which is a methyl methacrylate/ acrylic acid/polymethyl acrylate random polymer.

This polymer exhibits a weight-average molar mass of 52 000 g/mol and a number-average molar mass of 18 000,  
25 i.e. a polydispersity index I of 2.89.

It has a glass transition temperature (Tg) of 63°C.

**Example 2: Preparation of a poly(acrylic acid/methyl acrylate) polymer**

30

100 g of butyl acetate are introduced into a 1 liter reactor and then the temperature is increased so as to change from ambient temperature (25°C) to 90°C in 1 hour.

35 30 g of acrylic acid, 30 g of methyl acrylate, 40 g of butyl acetate, 70 g of isopropanol and 1.8 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane

(Trigonox<sup>®</sup> 141 from Akzo Nobel) are subsequently added at 90°C in 1 hour.

The mixture is maintained at 90°C for 1 hour.

90 g of methyl acrylate, 70 g of butyl acetate, 20 g of  
5 isopropanol and 1.2 g of 2,5-bis(2-ethylhexanoyl-  
peroxy)-2,5-dimethylhexane are subsequently introduced  
into the preceding mixture, still at 90°C and in  
1 hour.

The mixture is maintained at 90°C for 3 hours and then  
10 diluted with 105 g of butyl acetate and 45 g of  
isopropanol; the combined product is then cooled.

A 40% solution of polymer active material in the butyl  
acetate/isopropanol mixture is obtained.

15 A polymer is obtained comprising a first poly(acrylic  
acid/methyl acrylate) block or sequence having a Tg of  
80°C, a second polymethyl acrylate block having a Tg of  
10°C and an intermediate block which is an acrylic  
acid/methyl acrylate/polymethyl acrylate random  
20 polymer.

This polymer exhibits a weight-average molar mass of  
50 000 g/mol and a number-average molar mass of 17 000,  
i.e. a polydispersity index I of 2.95.

25 It has a glass transition temperature (Tg) of 49°C.

**Example 3: Preparation of a poly(acrylic acid/methyl  
acrylate/polymethyl acrylate/trifluoroethyl  
methacrylate) polymer**

30

100 g of butyl acetate are introduced into a 1 liter  
reactor and then the temperature is increased so as to  
change from ambient temperature (25°C) to 90°C in  
1 hour.

35 120 g of methyl methacrylate, 30 g of acrylic acid,  
60 g of trifluoroethyl methacrylate, 40 g of butyl  
acetate, 70 g of isopropanol and 1.8 g of

2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane (Trigonox<sup>®</sup> 141 from Akzo Nobel) are subsequently added at 90°C in 1 hour.

The mixture is maintained at 90°C for 1 hour.

5 90 g of methyl acrylate, 70 g of butyl acetate, 20 g of isopropanol and 1.2 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane are subsequently introduced into the preceding mixture, still at 90°C and in 1 hour.

10 The mixture is maintained at 90°C for 3 hours and then diluted with 105 g of butyl acetate and 45 g of isopropanol; the combined product is then cooled.

A 40% solution of polymer active material in the butyl acetate/isopropanol mixture is obtained.

15

A polymer is obtained comprising a first poly(acrylic acid/methyl methacrylate/trifluoroethyl methacrylate) block or sequence having a Tg of 85°C, a second polymethyl acrylate block having a Tg of 10°C and an  
20 intermediate block which is an acrylic acid/methyl acrylate/polymethyl acrylate/trifluoroethyl methacrylate random polymer.

This polymer exhibits a weight-average molar mass of  
25 53 000 g/mol and a number-average molar mass of 17 500, i.e. a polydispersity index I of 3.03.

It has a glass transition temperature (Tg) of 58°C.

30 **Example 4: Preparation of a poly(isobornyl acrylate/isobutyl methacrylate/2-ethylhexyl acrylate) polymer**

100 g of isododecane are introduced into a 1 liter reactor and then the temperature is increased so as to  
35 change from ambient temperature (25°C) to 90°C in 1 hour.

120 g of isobornyl acrylate, 90 g of isobutyl methacrylate, 110 g of isododecane and 1.8 g of

2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane (Trigonox® 141 from Akzo Nobel) are subsequently added at 90°C in 1 hour.

The mixture is maintained at 90°C for 1 h 30.

5 90 g of 2-ethylhexyl acrylate, 90 g of isododecane and 1.2 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane are subsequently introduced into the preceding mixture, still at 90°C and in 1 hour.

The mixture is maintained at 90°C for 3 hours and then  
10 diluted with 100 g of isododecane; the combined product is then cooled.

A 50% solution of polymer active material in isododecane is obtained.

15 A polymer is obtained comprising a first poly(isobornyl acrylate/isobutyl methacrylate) block or sequence having a Tg of 80°C, a second poly(2-ethylhexyl acrylate) block having a Tg of -80°C and an intermediate block which is an isobornyl  
20 acrylate/isobutyl methacrylate/ 2-ethylhexyl acrylate random polymer.

This polymer exhibits a weight-average molar mass of 77 000 g/mol and a number-average molar mass of 19 000,  
25 i.e. a polydispersity index I of 4.05.

It has a glass transition temperature (Tg) of 58°C.

**Example 5: Preparation of a poly(isobornyl acrylate/methyl methacrylate/2-ethylhexyl acrylate) polymer**

30

100 g of isododecane are introduced into a 1 liter reactor and then the temperature is increased so as to change from ambient temperature (25°C) to 90°C in 1 hour.

35 150 g of isobornyl acrylate, 60 g of methyl methacrylate, 110 g of isododecane and 1.8 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane

(Trigonox® 141 from Akzo Nobel) are subsequently added at 90°C in 1 hour.

The mixture is maintained at 90°C for 1 h 30.

90 g of 2-ethylhexyl acrylate, 90 g of isododecane and  
5 1.2 g of 2,5-bis(2-ethylhexanoylperoxy)-  
2,5-dimethylhexane are subsequently introduced into the  
preceding mixture, still at 90°C and in 1 hour.

The mixture is maintained at 90°C for 3 hours and then  
diluted with 100 g of isododecane; the combined product  
10 is then cooled.

A 50% solution of polymer active material in  
isododecane is obtained.

A polymer is obtained comprising a first poly(isobornyl  
15 acrylate/methyl methacrylate) block or sequence having  
a Tg of 100°C, a second poly(2-ethylhexyl acrylate)  
block having a Tg of -70°C and an intermediate block  
which is an isobornyl acrylate/methyl  
methacrylate/2-ethylhexyl acrylate random polymer.

20 This polymer exhibits a weight-average molar mass of  
76 500 g/mol and a number-average molar mass of 22 000,  
i.e. a polydispersity index I of 3.48.

It has a glass transition temperature (Tg) of 58°C.

25 **Example 6: Preparation of a poly(isobornyl acrylate/  
methyl methacrylate/2-ethylhexyl acrylate) polymer**

100 g of isododecane are introduced into a 1 liter  
30 reactor and then the temperature is increased so as to  
change from ambient temperature (25°C) to 90°C in  
1 hour.

150 g of isobornyl acrylate, 60 g of methyl  
methacrylate, 50 g of isododecane and 1.5 g of  
35 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane  
(Trigonox® 141 from Akzo Nobel) are subsequently added  
at 90°C in 1 hour.

The mixture is maintained at 90°C for 1 h 30.

150 g of 2-ethylhexyl acrylate, 150 g of isododecane  
and 1.5 g of 2,5-bis(2-ethylhexanoylperoxy)-  
2,5-dimethylhexane are subsequently introduced into the  
preceding mixture, still at 90°C and in 1 hour.

The mixture is maintained at 90°C for 3 hours and then  
diluted with 100 g of isododecane; the combined product  
is then cooled.

A 50% solution of polymer active material in  
isododecane is obtained.

A polymer is obtained comprising a first poly(isobornyl  
acrylate/methyl methacrylate) block or sequence having  
a Tg of 100°C, a second poly(2-ethylhexyl acrylate)  
block having a Tg of -70°C and an intermediate block  
which is an isobornyl acrylate/methyl  
methacrylate/2-ethylhexyl acrylate random polymer.

This polymer exhibits a weight-average molar mass of  
76 500 g/mol and a number-average molar mass of 22 000,  
i.e. a polydispersity index I of 3.48.

It has a glass transition temperature (Tg) of 58°C.

#### **Example 7: Nail varnish**

A nail varnish was prepared which has the following  
composition:

Polymer of example 1	23.8 g as AM
Butyl acetate	24.99 g
Isopropanol	10.71 g
Hexylene glycol	2.5 g
DC Red 7 lake	1 g
Hectorite modified with stearyl dimethylbenzylammonium chloride	
(Bentone® 27V from Elementis)	1.3 g

After application to the nails, this varnish was considered to exhibit very good properties of hold and of impact strength.

5    **Example 8: Mascara composition**

A mascara was prepared which has the following composition:

10	Beeswax	8 g
	Paraffin wax	3 g
	Carnauba wax	6 g
	Hectorite modified with distearyl dimethylbenzylammonium chloride	
15	(Bentone® 38V from Elementis)	5.3 g
	Propylene carbonate	1.7 g
	Filler	1 g
	Pigments	5 g
	Polymer of example 4	12 g as AM
20	Isododecane	q.s. for 100

The hold of the mascara film, after application to the eyelashes, was considered to be highly satisfactory.

25    **Example 9: Lipstick stick**

The following lipstick composition is prepared:

	Polyethylene wax	15%
30	Polymer of example 5	10% as AM
	Hydrogenated polyisobutene (Parleam from Nippon Oil Fats)	26%
	Isododecane	q.s. for 100
	Pigments	8.6%

35

The composition film obtained after application to the lips exhibits good hold properties.



**Example 10: W/O Foundation**

A foundation composition is prepared which comprises  
5 the following compounds:

	Phase A	Cetyl dimethicone copolyol (Abil EM 90 from Goldschmidt)	3 g
		Isostearyl diglyceryl succinate (Imwitor 780K from Condea)	0.6 g
10		Isododecane	18.5 g
		Mixture of pigments (hydrophobic titanium oxides and iron oxides)	10 g
		Polymer of example 5	8.7 g as AM
15		Polyamide powder (Nylon-12 from DuPont de Nemours)	8 g
		Fragrance	0.5 g
	Phase B	Water q.s. for	100
		Magnesium sulfate	0.7 g
20		Preservative (methylparaben)	0.2 g
	Phase C	Water	2 g
		Preservative (diazolinyl urea)	0.25 g

**Example 11: Lacquer**

25

1) Dispersing in water of the polymer from example 5

20 g of the polymer from example 5, dried beforehand,  
and 80 g of methyl ethyl ketone are introduced into a  
30 500 ml reactor.

Stirring is allowed to take place at ambient  
temperature until the polymer has dissolved  
(approximately one hour).

An aqueous solution comprising 80 g of water and 2.47 g  
35 of 2-aminomethylpropanol is introduced into the reactor  
over 5 minutes with vigorous stirring.

The mixture is left stirring for an additional 15 minutes.

The methyl ethyl ketone is then evaporated by distillation in order to recover the polymer as a  
5 dispersion in water comprising 19% of active material.

2) An aerosol comprising 30 g of the above aqueous dispersion of the polymer, 20 g of ethanol and 35 g of dimethyl ether, acting as propellant gas, is prepared  
10 and made up to 100 g with water.

This lacquer, once sprayed over the hair, makes it possible to obtain a hairstyle having good hold and a nonsticky feel.

WHAT IS CLAIMED IS:

1. A polymer comprising at least one first block and at least one second block which are incompatible with one another and which have different glass transition temperatures ( $T_g$ ), said first and second blocks being connected to one another via an intermediate segment comprising at least one constituent monomer of the first block and at least one constituent monomer of the second block and said polymer having a polydispersity index  $I$  of greater than 2.
2. The polymer as claimed in the preceding claim, which comprises a polydispersity index of greater than or equal to 2.5, preferably of greater than or equal to 2.8.
3. The polymer as claimed in the preceding claim, which comprises a polydispersity index of between 2.8 and 6.
4. The polymer as claimed in one of the preceding claims, which is soluble and/or dispersible, at ambient temperature, at an active material content of at least 10% by weight, in at least one solvent.
5. The polymer as claimed in one of the preceding claims, the weight-average molar mass ( $M_w$ ) of which is less than or equal to 150 000 g/mol.
6. The polymer as claimed in one of the preceding claims, the weight-average molar mass ( $M_w$ ) of which ranges from 35 000 to 150 000 g/mol and better still from 45 000 to 100 000 g/mol.

7. The polymer as claimed in one of the preceding claims, the weight-average molar mass ( $M_n$ ) of which is less than or equal to 40 000.

5 8. The polymer as claimed in one of the preceding claims, the weight-average molar mass ( $M_n$ ) of which ranges from 10 000 to 40 000 and better still from 12 000 to 25 000.

10 9. The polymer as claimed in the preceding claim, wherein the difference between the glass transition temperatures ( $T_g$ ) of the first and second blocks is greater than 20°C, preferably greater than 30°C and better still greater than 40°C.

15 10. The polymer as claimed in one of the preceding claims, wherein the first block has a  $T_g$  of greater than or equal to 40°C.

20 11. The polymer as claimed in one of the preceding claims, wherein the second block has a  $T_g$  of less than or equal to 20°C.

25 12. The polymer as claimed in claim 10, wherein the proportion of the block having a glass transition temperature of greater than or equal to 40°C ranges from 20 to 90% by weight of the polymer, better still from 30 to 80% by weight of the polymer and even better still from 50 to 70% by weight of the polymer.

30 13. The polymer as claimed in claim 11, wherein the proportion of the block having a glass transition temperature of less than or equal to 20°C ranges from 5 to 75% by weight of the polymer, preferably from 15 to 35 50% by weight of the polymer and better still from 25 to 45% by weight of the polymer.

14. The polymer as claimed in either of claims 10 and 12, wherein the block with a Tg of greater than or equal to 40°C has a Tg ranging from 40°C to 120°C.

5 15. The polymer as claimed in one of claims 11 to 13, wherein the block with a Tg of less than or equal to 20°C has a Tg ranging from 20°C to -80°C.

10 16. The polymer as claimed in any one of the preceding claims, wherein the first block has a Tg of greater than or equal to 40°C and results, in all or in part, from one or more monomers which are such that the homopolymers prepared from these monomers have glass transition temperatures of greater than or equal to  
15 40°C.

17. The polymer as claimed in claim 16, wherein the monomers for which the homopolymers have glass transition temperatures of greater than or equal to  
20 40°C are chosen from the following monomers:

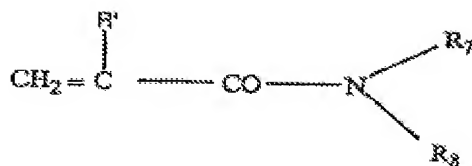
- methacrylates of formula  $\text{CH}_2=\text{C}(\text{CH}_3)-\text{COOR}_1$

in which R<sub>1</sub> represents a linear or branched alkyl group comprising from 1 to 4 carbon atoms, such as a methyl, ethyl, propyl or isobutyl group, it being possible for  
25 said alkyl group in addition to be optionally substituted by one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I, F), or R<sub>1</sub> represents a C<sub>4</sub> to C<sub>12</sub> cycloalkyl group,

- acrylates of formula  $\text{CH}_2=\text{CH}-\text{COOR}_2$

30 in which R<sub>2</sub> represents a C<sub>4</sub> to C<sub>12</sub> cycloalkyl group, such as isobornyl acrylate, or a tert-butyl group,

- (meth)acrylamides of formula:



where  $\text{R}_7$  and  $\text{R}_8$ , which are identical or different, each represent a hydrogen atom or a linear or branched alkyl group of 1 to 12 carbon atoms, such as an n-butyl, t-butyl, isopropyl, isohexyl, isooctyl or isononyl group; or  $\text{R}_7$  represents H and  $\text{R}_8$  represents a 1,1-dimethyl-3-oxobutyl group;

and  $\text{R}'$  denotes H or methyl,

10               - styrene and its derivatives, such as chlorostyrene,

              - and their mixtures.

18. The polymer as claimed in claim 16 or 17, wherein  
15 the monomers for which the homopolymers have glass transition temperatures of greater than or equal to  $40^\circ\text{C}$  are chosen from methyl methacrylate, isobutyl methacrylate, isobornyl (meth)acrylate, trifluoroethyl methacrylate, styrene and their mixtures.

20

19. The polymer as claimed in one of the preceding claims, wherein the second block has a  $T_g$  of less than or equal to  $20^\circ\text{C}$  and results, in all or in part, from one or more monomers which are such that the  
25 homopolymers prepared from these monomers have glass transition temperatures of less than or equal to  $20^\circ\text{C}$ .

20. The polymer as claimed in claim 19, wherein the monomers for which the homopolymers have glass  
30 transition temperatures of less than or equal to  $20^\circ\text{C}$  are chosen from the following monomers:

              - acrylates of formula  $\text{CH}_2=\text{CHCOOR}_3$ ,

R<sub>3</sub> representing a linear or branched C<sub>1</sub> to C<sub>12</sub> alkyl group with the exception of the tert-butyl group, in which occur(s), optionally intercalated, one or more heteroatoms chosen from O, N and S, it being possible  
5 for said alkyl group in addition to be optionally substituted by one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F), or R<sub>3</sub> representing a C<sub>1</sub> to C<sub>12</sub> alkyl-POE (polyoxyethylene) with repetition of the oxyethylene unit from 5 to  
10 30 times, for example methoxy-POE, or R<sub>3</sub> representing a polyoxyethylene group comprising from 5 to 30 ethylene oxide units;

- methacrylates of formula CH<sub>2</sub>=C(CH<sub>3</sub>)-COOR<sub>4</sub>,  
R<sub>4</sub> representing a linear or branched C<sub>4</sub> to C<sub>12</sub> alkyl  
15 group, in which occur(s), optionally intercalated, one or more heteroatoms chosen from O, N and S, it being possible for said alkyl group in addition to be optionally substituted by one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br,  
20 I, F);

- vinyl esters of formula R<sub>5</sub>-CO-O-CH=CH<sub>2</sub>,  
where R<sub>5</sub> represents a linear or branched C<sub>4</sub> to C<sub>12</sub> alkyl group;

- C<sub>4</sub> to C<sub>12</sub> alkyl vinyl ethers, such as methyl  
25 vinyl ether and ethyl vinyl ether;

- N-(C<sub>4</sub> to C<sub>12</sub> alkyl)acrylamides, such as N-octylacrylamide,

- and their mixtures.

30 21. The polymer as claimed in claim 19 or 20, wherein the monomers for which the homopolymers have glass transition temperatures of less than or equal to 20°C are chosen from alkyl acrylates for which the alkyl chain comprises from 1 to 4 carbon atoms, with the  
35 exception of the tert-butyl group.

22. The polymer as claimed in one of the preceding claims, wherein the first block and/or the second block comprises at least one additional monomer.

5 23. The polymer as claimed in the preceding claim, wherein the additional monomer is chosen from hydrophilic monomers, monomers having ethylenic unsaturation comprising one or more silicon atoms, and their mixtures.

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24. The polymer as claimed in claim 22 or 23, wherein the additional monomer is chosen from:

- 15 - monomers having ethylenic unsaturation(s) comprising at least one carboxylic or sulfonic acid functional group
- monomers having ethylenic unsaturation(s) comprising at least one hydroxyl functional group
- 20 - monomers having ethylenic unsaturation(s) comprising at least one tertiary amine functional group.

25. The polymer as claimed in one of claims 22 to 24, wherein the additional monomer(s) represent(s) from 1 to 30% by weight of the total weight of the first and/or second blocks.

26. A process for the preparation of a polymer as claimed in one of the preceding claims, which comprises the following stages:

- 30 - a portion of the polymerization solvent is introduced into a suitable reactor and is heated until the temperature appropriate for the polymerization is reached,
- 35 - once this temperature is reached, the constituent monomers of the first block are



introduced in the presence of polymerization initiator,

- at the end of a time T corresponding to a maximum degree of conversion of 90%, the constituent monomers of the second block and the other portion of the polymerization solvent are introduced,

- the mixture is allowed to react for a time T', at the end of which the mixture is cooled,

- the polymer is obtained in solution in the polymerization solvent.

27. The process as claimed in the preceding claim, wherein the polymerization temperature is 60-120°C.

28. A cosmetic composition, which comprises a polymer as claimed in any one of claims 1 to 25.

29. The cosmetic composition as claimed in the preceding claim, which comprises from 0.1 to 60% by weight, preferably from 5 to 50% by weight and more preferably from 1 to 40% by weight of the polymer.

30. The composition as claimed in either one of claims 28 and 29, which comprises a physiologically acceptable medium in which the polymer occurs in the soluble or dispersed form.

31. The composition as claimed in either one of claims 29 and 30, wherein the physiologically acceptable medium comprises a hydrophilic medium comprising water and mixtures of water and of hydrophilic organic solvent(s), such as alcohols and in particular linear or branched lower monoalcohols having from 2 to 5 carbon atoms, such as ethanol, isopropanol or n-propanol, and polyols, such as glycerol,

diglycerol, propylene glycol, sorbitol, pentylene glycol and polyethylene glycols.

5 32. The cosmetic composition as claimed in one of claims 28 to 31, which additionally comprises a fatty phase composed of fatty substances which are liquid or solid at ambient temperature and which are of animal, vegetable, mineral or synthetic origin.

10 33. The composition as claimed in any one of claims 28 to 32, which additionally comprises one or more cosmetically acceptable organic solvents.

15 34. The cosmetic composition as claimed in any one of claims 28 to 33, which additionally comprises one or more additional agents which are able to form a film chosen from plasticizing agents and coalescence agents.

20 35. The cosmetic composition as claimed in any one of claims 28 to 34, which additionally comprises one or more coloring materials chosen from water-soluble dyes and pulverulent coloring materials, such as pigments, pearlescent agents and glitter.

25 36. The composition as claimed in any one of claims 28 to 35, which additionally comprises fillers.

30 37. The cosmetic composition as claimed in any one of claims 28 to 36, which additionally comprises one or more ingredient(s) chosen from vitamins, thickeners, trace elements, softeners, sequestering agents, fragrances, basifying or acidifying agents, preservatives, sunscreen agents, surfactants, antioxidants, agents for combating hair loss, 35 antidandruff agents, propellants and their mixtures.

38. The cosmetic composition as claimed in any one of claims 28 to 37, which is provided in the form of a suspension, dispersion, solution, gel, emulsion, in particular oil-in-water (O/W) or water-in-oil (W/O) or multiple (W/O/W or polyol/O/W or O/W/O) emulsion, cream, foam, dispersion of vesicles, in particular of 5 ionic or nonionic lipids, two-phase or multiphase lotion, spray, powder or paste, in particular soft paste or anhydrous paste.
- 10 39. The cosmetic composition as claimed in any one of claims 28 to 38, which is a composition for making up or caring for keratinous substances.
- 15 40. The cosmetic composition as claimed in any one of the claims, which is a hair product, such as a lacquer or a shampoo.
- 20 41. The composition as claimed in one of the preceding claims, which is a nail varnish.
42. The composition as claimed in one of the preceding claims, which is a product for making up the lips.
- 25 43. The composition as claimed in one of the preceding claims, which is a product for making up the eyes.
44. The composition as claimed in one of the preceding claims, which is a product for making up the 30 complexion.
45. A cosmetic method for making up or caring for keratinous substances comprising the application, to the keratinous substances, of a cosmetic composition as 35 claimed in one of claims 28 to 45.

46. The use of a polymer as claimed in any one of claims 1 to 44 in a cosmetic composition as agent for improving the hold of said composition.

- 5 47. The use of a polymer as claimed in any one of claims 1 to 44 in a composition exhibiting improved hold properties.